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(54) Title: METHOD AND MEANS TO BRING ABOUT AND MAINTAIN A MICRO-BIOLOGICALLY CLEAN ENVIRONMENT IN ROOMS

(57) Abstract

A method and means to establish and maintain a micro-biologically clean environment in rooms, at which ceilings, wall surfaces and eventually other surfaces in a room, preferably after a preceding sanitation, are coated with a layer of a composition of materials which is porous, open for diffusion and preventing condensation, including granules of organic or expanded inorganic materials and binders, and at which a water soluble sanitation liquid is spread on the porous composition of materials at repeated intervals of time, at which the composition of materials remains a sanitizer in the pore system of the composition of materials as its water is evaporated.

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METHOD AND MEANS TO BRING ABOUT AND MAINTAIN A MICRO-BIOLOGICALLY CLEAN ENVIRONMENT IN ROOMS

TECHNICAL FIELD

The present invention concerns a method and a means to bring about and maintain a micro-biologically clean environment in rooms by coating of the wall surfaces and any other surfaces in a room with a, in this connection, new composition of materials and a treatment of the same.

BACKGROUND TECHNICS

Activities with high demands on hygiene e.g. food industries, hospitals, laboratories etc. are regularly cleaned by different types of sanitizers. The demands on hygiene also lead to that a stress is laid on the materials which are used as lining in ceilings, walls and floors. The predominant conception is that only hard, smooth and non-porous materials should be used on surfaces in this type of rooms. If possible tiles, stainless plate, epoxy paints should be used, but by reason of costs also simplier in-door paints such as bright latex paints, oil and alkyd paints etc. These materials are simple to wash from visible contaminants but has considerable drawbacks from the point of sanitation. It is a known but disregarded fact that painted surfaces in a room never can be completely diffusion tight. Also at the application of the paint layer craters and pores arise and when the paint is aged cracks arise. Additionally the equipment of the room demands that screws, nails, pipes, cables, ventilation ducts etc. are attached to and brought through the painted surfaces.

Food industries as a rule has a high air humidity. The vapour pressure in the room by that as a rule is higher than in the surrounding ceilings, walls and floors. Consequently a diffusion of vapour occurs in all openings in the painted coating of the surface, (also microscopical), at which the vapour condensates in the

wall behind the coating of the surface. The condensated moist which is transferred into a liquid state cannot in the same easy way move back through the tight coating of the surface as the vapour pressure in the room drops. The walls in rooms with a high air humidity as a rule contain an excess of humidity. This humidity makes a good condition for the growth of micro-organisms and in humid locations this growth behind the paint layers is a problem.

The rooms are daily cleaned in that floors, walls and equipment are washed with a high pressure washer, after which the surfaces, which are to be kept free from micro-organisms, are treated with a sanitizer. At this sanitation the major part of the sanitizers which are sprayed upon walls and ceilings quickly flow away and evaporate from the surface. As the sanitizers only are active in a liquid state the time in which they affect the micro-organisms is proportionately short and the effiency consequently will be very low. Besides the sanitizer only will reach the micro-organisms on the outside whereas micro-organisms located behind the coating are protected of the same. The surface thus is re-infected not only by micro-organisms in the air in the room but above all by micro-organisms remaining on the back of the paint layer. As the activity of the sanitizer has ceased the micro-organisms penetrate from the growing locations on the back of the paint layer, which explains why the visible or measurable re-infection sometimes will be surprisingly quickly. The re-infection often takes place in a shorter time than 24 hours after the sanitation. This is a problem as most industries have difficultes for to carry out mostly one sanitation every 24 hours.

Porous materials traditionally have been regarded as completely unsuitable in rooms with high demands on hygiene. They are regarded as difficult to clean, attracting contaminants and micro-organisms and by that be a good growing base for bacteria, mould, algae, fungi etc.

At laboratory tests and full-scale tests it has now surprisingly been proved that certain types of porous paints has a considerably better resistance to micro-organisms and even better than stainless steel plate. Tests also surprisingly have proved that these types of porous materials are easier to sanitate but corresponding smooth surfaces. Such a porous material is described in the swedish patent publication SE-C-387 681, by which it is also known to prevent or lower the presence of condensate on a surface with a layer of a porous composition of materials including granules with adsorbing and desorbing qualities. This composition of materials also has good heat insulating qualities, which means that a layer of this composition keeps a little higher temperature but a corresponding smooth surface in one and the same room. As a consequence of that the porous composition of materials do not attract dust and contamination from the air to the same extent as a smooth surface.

DESCRIPTION OF THE INVENTION

The object with the present invention is to bring about a method and means to establish and maintain a micro-biologically clean environment in rooms in which an activity whith strict hygiene restrictions is to take place. The object has been achieved by a method characterized in that ceilings, wall surfaces and eventually other surfaces in a room, after a preceding sanitation is coated with a layer of a compostion of materials which is porous, open for diffusion and preventing condensation, including granules of organic or expanded inorganic materials and binders, and that a water soluble sanitation liquid is spread on the layer with the porous composition of materials at repeated intervals of time, at which as the water in the sanitation liquid is evaporated a sanitizer is remaining in the pore system of the composition of materials. The means for to carry out the method according to the invention is characterized in that it comprises a porous, moisture-adsorbing and

condensate-preventing composition of materials including granules of organic or expanded inorganic materials and a water soluble sanitation liquid, which is spread upon the composition of materials, and which, as the water in the same is evaporated, is remaining a sanitizer, preferably in the shape of vapour in, and/or in a solid state in the pore system of the composition of materials. Preferably the composition of materials include one or more porous materials such as perlite, zeolite, bentonite, micronized silicon dioxide or christobalite. The composition of materials also can include one or more materials whith the capability to take up water molecules directly from the surrounding air, such as salts, silicon dioxide gel, starch or derivates of cellulose, gypsom, alkali silicate, aluminium silicate or fullers earth. The composition of materials also can include one or more water-insoluble fungicides and bactericides such as N-arylamide, alkylarylsulphone acid, octylisothiazolinone, chloromethylisothiazolinone, methylisothiazolinone, iodinated alkynalkylkarbamate, 1.2-benzisothiazol-3(2H)-one separately or in different combinations. Other characteristics will be clear from the claims.

At sanitation of a porous composition of materials according to the invention a sanitation liquid comprising a sanitizer is sprayed, pencilled or otherwise brought to spread in the pore system of the composition of materials. The sanitation liquid by that is absorbed by means of capillary forces in the porous composition of materials and equally disttributed over all of the surface coated with the actual composition of materials. After spreading of the sanitation liquid mainly the water in the same evaporates, at which the sanitizer by a good surface adhesion remains in the pore system of the composition of materials. The evaporation of the water from the composition of materials is intensified mainly by that the pore system substantially enlarges the coated surface and that the composition of materials by its heat

insulating capability keeps a higher temperature but a corresponding smooth, painted surface. Sanitizers such as diecyl dimethyl ammoniumchloride, sodium orto fenylfenate tetrahydrate, glutaraldehyde, chloromethylisothiasolinione separately or in different combinations has a capability to dissolve the walls of the cells of the micro-organisms making that water penetrates into the cells which by that are exploded. By that the sanitizers also lower the surface tension in the pore system the water will leave this system faster compared with a pore system only containing water. The sanitizer first mentioned also has an antistatic effect, which lowers the possibilities for the micro-organisms to get caught on the coated surface.

A concentration of the sanitizers in water preferably are 150 to 500 ppm and are gradually increased in this interval at subsequent sanitations. After a certain number of sanitations with one and the same sanitizer the micro-organisms become resistant despite higher concentrations why the sanitizer must be exchanged. As resistance also is commenced for the second sanitizer it will be able to return to the first sanitizer to which the micro-organisms no more are resistant. Normal intervals for the change of sanitizer is four months but tests indicates that the intervals can be extended by the efficiency of the invention.

By the invention the following effects are reached:

1. The composition of materials keeps the surface dry for longer periods by its capability to prevent condensation during normal production conditions but a smooth, tight surface. When the surface is dry no micro-biological activity takes place.

2. The pore system of the composition of materials is more fine-porous but a normal wall of concrete, brick or plaster. The capillary forces by that will adhere eventual condensate in the wall material, which decreases the conditions for a micro-biological activity in

the wall itself.

3. The composition of materials is open for diffusion and by that allows a diffusion of vapor whithout restrictions in both directions also from the building material behind.

4. When the sanitation liquid is spread on the composition of materials it distributed by means of the capillary forces all over the entire surface layer and penetrates into the building material behind. By that a deep sanitation is achieved.

5. At a thickness of the coating of 1 mm the composition of materials has a capability to adsorb and keep ½-1 litre of sanitation liquid per m^2, which is considerably more but what is normally used at sanitation. By that all sanitation liquid will be used and will be given a possibility to act during a sufficiant period of time in order to effectively kill all micro-biological life in and on the surface layer.

6. As the sanitation liquid evaporates, the active substance, e.g. the sanitizer, which has a good surface adhesion, will be caught on the walls in the pore system of the composition of materials. In a dry condition, when normal micro-biological activity is impossible, the sanitizer is inactive. As the composition of materials will be humid again the sanitizer again will be activated. In this way the effect of the sanitizer will be very durable.

7. By inter-action between the composition of materials and the sanitation liquid the concentration of the sanitizer can be kept very low. By that it will last a longer time but for traditional sanitation methods before the economic degree of concentration must be exceeded and a sanitizer with another way of acting must be used. This reality makes the method cost effective as well as lenient for the environment relative to common sanitation methods.

8. The insulating and condensation-preventing

effect of the compostion of materials as well as the anti-static characteristics of the sanitation liquid work against re-contamination as well as re-infection of the surface.

At a laboratory test re-infection of a smooth, painted surface was compared with a surface coated with the porous composition of materials according to the invention. The test surfaces firstly was sanitated with the same kind of sanitation liquid after which they were to dry. After that the test surfaces were infected by organic material from dead animal bodies, after which they were kept in a climate chamber with alternating temperature and air humidity. Sampling each third hour showed a micro-biological growth on the smooth, painted test surfaces whithin 24 hours, whilst the test surfaces coated with the porous composition of materials according to the invention were intact more than 7 days and nights.

CLAIMS

1. A method to establish and maintain a micro-biologically clean environment in rooms, c h a r a c t e r i z e d in that ceilings, wall surfaces and eventually other surfaces in a room, preferably after a preceding sanitation, are coated with a layer of a composition of materials which is porous, open for diffusion and preventing condensation, including granules of organic or expanded inorganic materials and binders, and that a water soluble sanitation liquid is spread upon the layer of the porous composition of materials at repeated intervals of time, which as the water in the sanitation liquid has evaporated remains a sanitizer in the pore system of the composition of materials.

2. A method according to claim 1, c h a r a c t e r i z e d in that the sanitation is carried out by means of at least two types of sanitizers which are used alternatively at intervals of 1 - 12 months.

3. Means for carrying out the method according to claim 1 or 2 to bring about a micro-biologically clean environment in rooms, c h a r a c t e r i z e d in that it comprises a porous, moist-adsorbing composition of materials including granules of organic or expanded inorganic materials, which is brought in a layer on ceilings, wall surfaces and eventually other surfaces in a room, and a water soluble sanitation liquid, which is spread on the composition of materials and which, as its water is evaporated, remains a sanitizer in the pore system of the composition of materials.

4. Means according to claim 3, c h a r a c t e r i z e d in that the composition of materials comprises one or more porous materials such as perlite, zeolite, bentonite, micronized silicon dioxide or christobalite.

5. Means according to claim 3 or 4, c h a r a c t e r i z e d in that the composition of materials comprises one or more materials with a capability to take

up water molecules directly from the surrounding air, such as salts, silicon dioxide gel, starch or derivates of cellulose, gypsom, alkali silicate, aluminium silicate or fullers earth.

6. Means according to any of the claims 3-5, c h a r a c t e r i z e d in that the composition of materials comprises one or more water insoluble fungicides and bactericides such as N-aryl-amide, alkylarylsulphone acid, chloromethylisothiazolinone, methylisothiazolinone, iodinated alkyn-alkyl-karbamate, 1.2-benzisothiazol-3(2H)-one separately or in different combinations.

7. Means according to any of the claims 3-6, c h a r a c t e r i z e d in that the sanitizer mainly is active in water and inactive in a dry condition such as diecyl dimetyl ammoniumchloride, sodium orto fenylfenate tetrahydrate, glutaraldehyde, chloromethylisothiasolinone separately or in different combinations.

8. Means according to any of the claims 3-7, c h a r a c t e r i z e d in that the composition of materials has a capability to quickly adsorbe and desorb liquids.

9. Means according to any of the claims 3-8, c h a r a c t e r i z e d in that the concentration in water of the sanitizers are preferably 150 - 500 ppm and are gradually increased in this interval at the sanitation work going on.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 92/00763

A. CLASSIFICATION OF SUBJECT MATTER

IPC5: A61L 9/00, B05D 5/00, E04B 1/72
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: A61L, B05D, E04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
A	WO, A1, 9104305 (MANCHEM LIMITED), 4 April 1991 (04.04.91), abstract --	1-9
A	AU, A, 134966 (UNITED WALLPAPER INC.), 16 January 1947 (16.01.47), the claims --	1-9
A	GB, A, 2083063 (AB BONNIERFORETAGEN), 17 March 1982 (17.03.82) --	1-9

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE, B2, 1784797 (STORK, WALTER), 21 August 1975 (21.08.75), column 1, line 62 - column 2, line 13, claim 1	1-9

INTERNATIONAL SEARCH REPORT

Information on patent family members

29/01/93

International application No.
PCT/SE 92/00763

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO-A1- 9104305	04/04/91	AU-A- 6341990	18/04/91
		EP-A- 0491773	01/07/92
AU-A- 134966	16/01/47	NONE	
GB-A- 2083063	17/03/82	US-A- 4364994	21/12/82
DE-B2- 1784797	21/08/75	NONE	